

## ENVIRONMENTAL SUSTAINABLE BUILDING DESIGN AND CONSTRUCTION

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**ABSTRACT:** *Global or national problems are rarely as discrete from one another as we might think. They are often, in fact, linked in complex ways. Both the emergence of global crises, and the policies put in place to address them, can and often do overlap in important ways. Such is the case with the global or national financial crisis which leads to recession in some cases and the broader ongoing global environmental crisis. Amidst this crisis, this paper examines ways of creating sustainable buildings, building design and construction (green buildings) which are structurally stable, functional and healthy for people to live and work in and however reducing carbon dioxide emission both regionally and nationally. Investigations clearly shows that Many natural resources and building materials require mining, processing, refining and ultimately manufacturing, transport and delivery before they are utilized in construction. The energy used during these processes is high and have greater risk of physical, health, financial and environmental implications at large. As a result the emergence of sustainable building, or green building, has brought about an awareness of what the building industry can do to curb high energy use, minimize waste, and create environments that are healthy and productive.*

**KEYWORDS:** Design, Structurally Stable, Energy, Green Building

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### INTRODUCTION

Our developing world has caused many to be concerned over sustaining our resources, environment, and way of life. We face an escalating population growth and the concern over having enough resources for development to meet our needs in the present and that of future generations (Darren, 2010). The consumption of material and energy has increased at an alarming rate over the past two decades, especially in the built environment, Building construction currently consumes between 70-80% of raw materials worldwide. With significant growth taking place in the building sector, the burden being placed on limited resources is increasing – resources that one day will run out.

Most people would probably agree that innovation and technology are essential in our world to progress and make new discoveries that benefit mankind. Yet at the same time, there has been an effort by governments and business enterprise over the years to move toward a more balanced way of growth that is sustainable. This is the cause of sustainable development.

Sustainability involves the interactions and significant relationships among environmental, social and economic parameters. With reference to the building sector, sustainability is about ensuring that a building is environmentally friendly, economically feasible as well as that it provides a healthy and quality indoor environment to its users. Sustainable building construction refers to various methods applied for implementing construction projects that involve environmental preservation, increased reuse of waste for the production of

construction materials, actions fruitful to the society, and profitable aspects for the company (John, 2003).

A building is better described as a process rather than a product. This process involves correlating and complementary technical, environmental and economic parameters. To this regard, the environmental information could be better addressed and more effectively used in the general design process. In this early design stage the principles of structural response, durability and reliability of a structural system are also involved, while all these various parameters are closely related and significant in resolving cost, resource and environmental constraints. Building construction and operation have an enormous direct and indirect impact on the environment. They use vast amounts of energy and raw materials and produce waste and harmful emissions to the environment, some materials and products that claim to be “environmentally friendly”, “green” or “sustainable” often do not live up to their claim (Vince, 2007). Typical buildings in earlier decades were big users of chlorofluorocarbons (CFC) that degrade the ozone layer, and fossil fuels that emit greenhouse gases.

As economies and population expand, designers and builders face an increasing challenge to meet the demands of new and renovated buildings that are secure and healthy while minimizing harmful effects of the environment. This expansion and growth brings about new challenges for industry professionals to design and build buildings that are resource efficient, and have good indoor environmental quality (Lewis, 2004). This study attempts to answer questions on whether the new emphasis on sustainability in our building industry is helping to improve our environment both externally and internally, cost effective, affects our health positively, and a growing factor in our economy.

## **MATERIALS AND METHODS**

This research work considers giving a broader picture or knowledge of what green building is all about and also investigating how green building has been perceived within the Ibadan metropolis, Oyo state, Nigeria. Sixty-five (65) firms were considered during this survey. A self-selecting questionnaire was developed to ascertain the outlook and experience of local architects and civil engineers regarding the green building industry.

## **RESULT AND DISCUSSION**

In this research work, questionnaires were used to achieve the objectives. The level of experience in sustainable design and attitude toward green building were determined. With the firms that had experience, questions were asked on whether it was a positive or negative experience, and how was it different from conventional designed projects. Other areas of interest were finding out if the process of working with green design promoted more integration, and how it affected communication and teamwork. Of firms without experience, the goal was to find out why they had not been involved and what the perceived barriers were to getting involved. Had the firm persuaded clients or any of the staff members in the company to attempt a green building project? If they decided to pursue green design more, would it be a marketable advantage for their company. Another focus was to find out if they

saw themselves working with green design in the future; if no, why not? One last element was to get a better focus on their attitude, and that of their clients, toward green building.

### Result from Green Building Experience

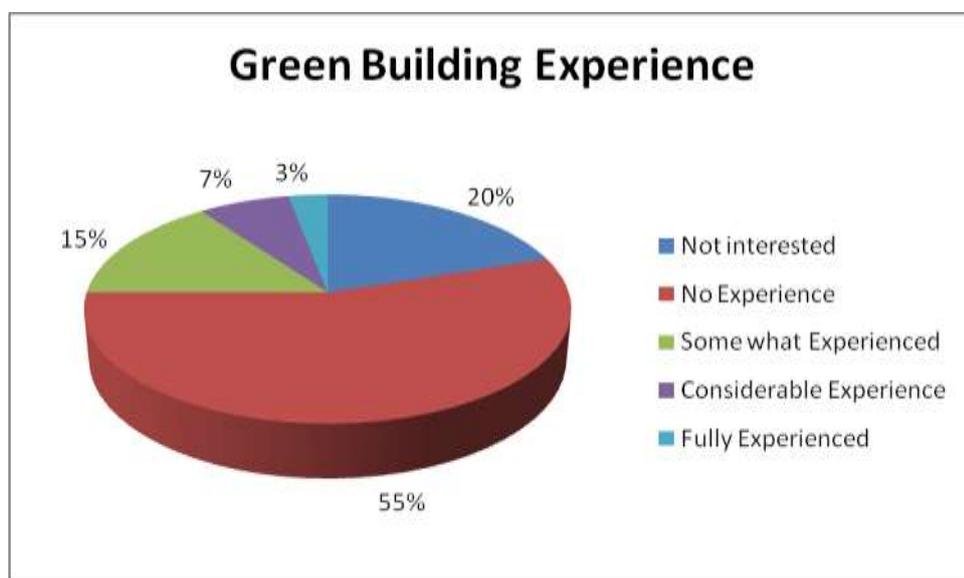
The results were mixed. Asked what level of experience they had; 20% (13) were not Interested, 55% (35) had no experience to date, 15% (10) had some experience with at least doing a partial green project, 7% (5) had considerable idea and 3%(2) were fully experienced and having incorporated several green design features in projects and some accredited staff in the firm.

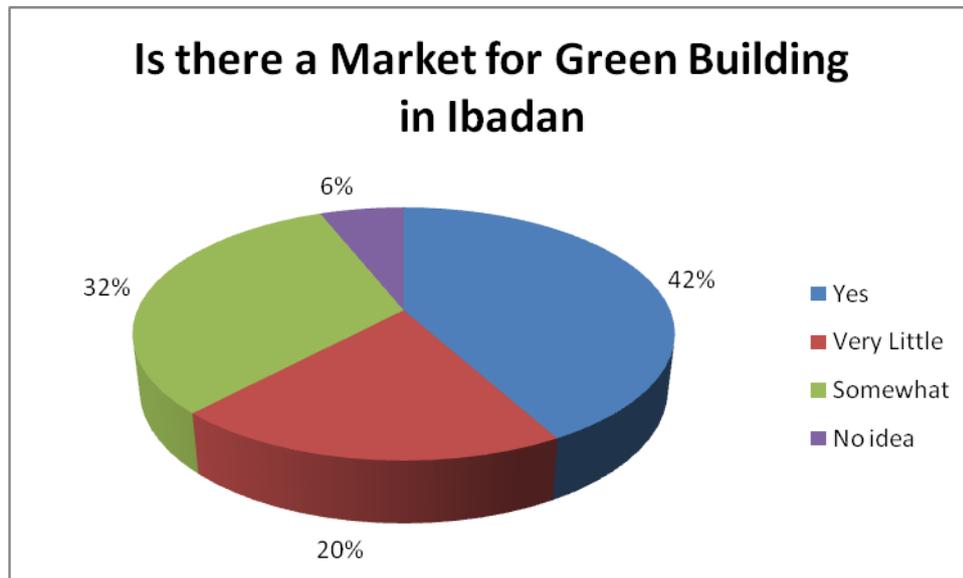
Of the 4 firms that had experience in green design, they said it was a positive experience for various reasons. Asked what caused the experience to be positive or negative, some responses including “doing the right thing and making a difference,” and “ knowing that you’re trying to do things better for the future and making things better for the present,” was why they felt it to be positive. Some respondents, however, cited that working with green building, specifically an Energy and Environmental Design project, would be cumbersome and require a lot of hoops to jump through.

### Result for green building market.

42% (27) said there were green building market in Ibadan, 20% (13) said very little exist, 32% (21) were not really sure whether it exist and 6%(4) have no idea of green market existence as shown in figure 2 below. The result on green market from the survey conducted made it clear that there were varying reasons why firms were not involved with green building. One of the main concerns was cost, despite the concern over cost, when asked if a green project necessarily would cost more, some said they weren’t sure or that it wouldn’t need to cost more.

However, the city opted to not obtain Energy and Environmental Design certification because of additional costs and documentation requirements. They are, however, proceeding with some green features in the project. Of the firms questioned, said there was a lack of client interest or education regarding green building which inhibited them from pursuing it any further.



**Fig 1 Green Building Experience****Fig 2 Market for Green Building in Ibadan**

## CONCLUSION AND RECOMMENDATION

Sustainable development involves an effort and mindset in utilizing best practices to ensure that our valuable resources are used in the most efficient way possible, that waste is minimized, and that we sustain our human and natural environments now and for future generations. One predominant area to incorporate these principles is in building resource efficient buildings, or green buildings. In this research work the nature of green building and its role in the construction business was presented. This research work shows how it is affecting the way buildings are being constructed, that it is making a difference in our internal and external environment, and provides practical methods of achieving the goal of energy efficient and healthy buildings for occupants. The level of involvement in green building in the local building community and throughout Ibadan was determined. From the result established from this research work, it is recommended that an effort should be made in utilizing best practices to ensure that our valuable resources are used in the most efficient way possible, that waste is minimized, and that we sustain our human and natural environments now and for future generations. One predominant area to incorporate these principles is in building resource efficient buildings, or green buildings.

The entire element involved in the process of developing and constructing a green building should satisfy environmental policy of the state. The process involves effective site and building design, construction, materials, indoor air quality, systems and operation.

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